CLAIMS

1-15. (cancelled)

16. (currently amended) A ~~valve leaflet for use in a~~ cardiac valve~~, wherein said valve comprises~~ comprising a frame and at least two flexible leaflets moveable between an open and closed position; wherein the frame comprises an annular portion defining an (XY) plane which, in use, is disposed substantially perpendicular to the blood flow, the frame having first and second ends, one of the ends defining at least two scalloped edge portions separated and defined by at least two posts, wherein said leaflet has first and second lateral edges each attached ~~attachable~~ to a scalloped edge portion of a corresponding post of the frame, wherein the leaflet is formed such that the length of the leaflet between the lateral edges measured at each ~~any~~ height (Z) along the lateral edges in an (XY) plane substantially perpendicular to the direction in which the height (Z) is measured ~~the blood flow~~ is defined by a parabolic function wherein the lengths determined by the parabolic function vary in a substantially linear fashion with the height (Z) when the valve is in a closed position.

17. (currently amended) A cardiac valve ~~leaflet~~ as claimed in claim 16 wherein the parabolic function is defined by

$$Y_Z = \left(\frac{4R}{L_Z^{\,2}}\right) x \cdot (L_Z - x)$$

wherein Y_Z = Y offset at a particular co-ordinate X and Z

R = parabolic maximum

L_Z = straight line distance between a first lateral edge for attachment to a corresponding post and a second lateral edge for attachment to second corresponding post at a height Z

x = distance from origin of first corresponding post towards second corresponding post

and the length of the parabola defined by the above is determined by

$$\text{Length} = \int_0^l \sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dx$$

18. (currently amended) A cardiac valve prosthesis comprising:

a frame and at least two flexible leaflets~~ as claimed in claim 16~~;

wherein the frame comprises an annular portion defining an (XY) plane which, in use, is disposed substantially perpendicular to the blood flow, the frame having first and second ends, one of the ends defining at least two scalloped edge portions separated and defined by at least two posts, each leaflet being attached to the frame along a scalloped edge portion and being movable between an open and a closed position;[[,]]

wherein the leaflet is formed such that the length of the leaflet between the lateral edges measured at each height (Z) along the lateral edges in an (XY) plane substantially perpendicular to the direction in which the height (Z) is measured is defined by a parabolic function wherein the lengths determined by the parabolic function vary in a substantially linear fashion with the height (Z) when the valve is in a closed position;

each of the at least two leaflets having a blood inlet side, a blood outlet side and at least one free edge, the at least two leaflets being in a closed position when fluid pressure is applied to the outlet side such that the at least one free edge of a first leaflet is urged towards the at least one free edge of a second leaflet, and the at least two leaflets being in an open position when fluid pressure is applied to the blood inlet side of the at least two leaflets such that the at least one free edge of the first leaflet is urged away from the at least one free edge of the second ~~or further~~ leaflet.

19. (previously presented) The cardiac valve prosthesis as claimed in claim 18 wherein the parabolic function defining the length of a leaflet in the circumferential direction (XY) between the posts at any position along the longitudinal axis (Z) of a post is defined by

$$Y_Z = \left(\frac{4R}{L_Z^{\,2}}\right) x \cdot (L_Z - x)$$

Wherein Y_Z = Y offset at a particular co-ordinate X and Z

R = parabolic maximum

L_Z = straight line distance between a first post and a second post of the frame at a height Z

x = distance from origin of post towards another post

and the length of the parabola defined by the above is determined by

$$\text{Length} = \int_0^l \sqrt{1+\left(\frac{dy}{dx}\right)^2}\, dx$$

20. (previously presented) The cardiac valve prosthesis as claimed in claim 18 comprising three leaflets.

21. (previously presented) The cardiac valve prosthesis as claimed in claim 18 wherein the frame is a collapsible stent.

22. (previously presented) The cardiac valve prosthesis as claimed in claim 18 wherein the length of the free edge of the leaflet is increased relative to the length of the leaflet in an (XY) plane substantially perpendicular to the blood flow by configuring the free edge as a parabolic shape in the height (Z) of the leaflet.

23. (previously presented) The cardiac valve prosthesis as claimed in claim 22 wherein the free edge of the leaflet is trimmed to provide a parabolic shape in the height (Z) of the leaflet such that the maximum depth of the parabola is furthest from the notional midpoint of the untrimmed free edge.

24. – 30. (canceled)